WING AREA, WING LOADING AND FLIGHT DURATION

By George White

In the January 2012 issue of George Mansfield's Scale Staffel Newsletter, George included some graphs and data concerning the relationship of wing area and wind loading to flight duration. He also published an article by Bob Hodes showing a very clever method of calculating wing area, which is included elsewhere in this exciting issue. There's been what I refer to as an "old wive's tale" that a wing loading of around .5 grams /square inch of wing area is really the upper limit for a competitive airplane. George has taken the trouble to look further into that, and specifically examine what Bill McCombs' book "Makng Scale Model Airplanes Fly" and A.Peterson in the Minisota Model Aero News of January 1994 had to say about these relationships. He condensed the information into the following table. It's easy to see why my 26sqin peanut which weighs 10 grams isn't likely to be much of a challenger. This information is some pretty handy stuff to post above our workbench as we start gluing sticks and tissue.

George says that Bob Hodes uses the **actual wing area** to figure out wing loading, which in turn relates to potential flight duration. The weights listed in the table are the weight of the model without motor. As you can see, the allowable wing loading goes up with increasing wing area because, for any speed, the Reynolds number is higher, resulting in a higher lift/drag ratio.

George describes two examples: an 80 sq-in. FA Moth shouldn't weigh more than 30 gm to be competitive; a 100 sq-in

Wing Area (sq. in.)	Max structural wt. (gm)	Max wing loading (gm/sq.in.)
10	1.63	0.163
15	2.80	0.186
20	4.13	0.207
25	5.63	0.225
30	7.29	0.243
35	9.09	0.260
40	11.0	0.276
45	13.1	0.292
50	15.3	0.307
55	17.7	0.322
60	20.2	0.336
65	22.7	0.350
70	25.4	0.363
75	28.2	0.376
80	31.1	0.389
85	34.1	0.402
90	37.2	0.413
95	40.4	0.425
100	43.6	0.436
105	46.9	0.447
110	50.3	0.457
115	53.7	0.467
120	57.2	0.477
125	60.8	0.486
130	64.4	0.495
135	68.0	0.504
140	71.7	0.512
145	75.3	0.520
150	79.1	0.527
155	82.8	0.534
160	86.5	0.541
165	90.2	0.547
170	94.0	0.553
175	97.7	0.558
180	101.4	0.564

Free Flight Rubber Scale Models:
Recommended maximum structure weights
and wing loadings for competition success
Sources: Wm. McCombs, "Making Scale
Model Airplanes Fly" and A. Peterson,
"Minnesota Model Aero News", Jan, 1994

WW2 combat ship can weigh as much as 43 gms, etc.